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ABSTRACT

For years the issue of class size has been the subject of hundreds of educational research studies. The effects of class size on student achievement, student and teacher attitudes, instructional setting, and total classroom environment have been examined and re-examined. In general, the findings of these studies have been inconclusive, though for every study supporting the efficacy of large classes, two favor small classes. Those studies revealing no effect on achievement due to class size are based almost entirely on measures of cognitive learning, while those that find class size significant measure other areas of growth as well, such as mental health, problem solving skills, and aesthetic, personal, and creative development. For the most part, class size is only one variable among a number of important variables affecting learning. These include student and teacher characteristics, the instructional program and its goals, the subject matter being taught, the reasons for altering class size, and economic factors. Much of the research on class size is methodologically weak and should be evaluated in its own right before its results are accepted. (Author/PGD)

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The Effects of Class Size on Student Achievement

A Review of the Literature

South Carolina
Department of Education

Charlie G. Williams
State Superintendent of Education

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Foreword

The effects of teacher-pupil ratio on student achievement has become an issue of increasing national, state, and local significance. Volumes of research examining this issue continue to disclose varied and inconsistent outcomes.

This review of the literature surveys a number of studies addressing the subject. Though there are no conclusive answers to be revealed, there are varied findings which apply to different settings. The survey represents the findings of researchers and educators who have examined the issue from diverse perspectives. This document is not intended to provide answers but rather to raise questions.

Introduction

For years the issue of class size has been the subject of hundreds of educational research studies. The effects of class size on student achievement, student and teacher attitudes, instructional setting, and total classroom environment have been examined and re-examined. In general, the findings of these studies have been varied: some favoring small classes, some favoring large, and others reflecting no differences in learning or classroom environment due to class size. Repeatedly, studies have concluded that small classes are no guarantee or panacea for desired affective and academic outcomes.

Nonetheless, despite inconclusive findings, one definite conclusion has been reached: that small classes at least provide the opportunity for improved instructional practices, warmer interaction, and increased student achievement. And in NEA's 1975 Teacher Opinion Poll, teachers were asked, "If you could make one change you think would improve your own morale or professional satisfaction as a teacher, what would the change be?"[1] The top ranking response was lower class size.

Findings Which Support Small Classes

The results of twice as many studies favor small classes over large classes. Those studies which reveal class size to have no effect on student achievement are based almost totally on student achievement in terms of cognitive learning; those which find class size to be significant measure other areas of growth as well, including aesthetic, personal, and creative development; problem solving skills; and mental health.[2]

Findings have been revealed that when class size is reduced, classroom management is easier and more effective; less time must be spent on discipline, and more can be devoted to teaching. In the larger classes, teachers must spend most of the time either handling or anticipating disruptive behavior. As class size increases, teachers are pressured to be dispensers of knowledge, finding time to work with small groups only when they can immobilize a large remaining portion of the class with "seat work."[3]

Many studies have revealed that in smaller classes, students usually:

- Learn basic skills and subject matter better, more easily, and faster.
- Think more creatively and divergently.
- Develop more positive attitudes, perceptions, and better human relations with other students and their teachers.
- Function more effectively as members and leaders of varying size groups.
- Achieve higher attention and lower absence rates.
- Are more fluent, proficient in writing, listening, and speaking skills, including: giving examples, providing descriptions, using vocabulary, comparing and contrasting ideas and sequencing them in logical order.
- Demonstrate less fighting, shoving, pushing, crowding, striking, or other aggressive acts.

- Have fewer fears about not being right or about not being free to say what they mean.
- Have more trust and confidence in their peers and their teachers, and thus in themselves.
- Contribute more voluntarily, display more initiative, and participate more promptly, eagerly, and enthusiastically.

And in smaller classes, teachers have the opportunity to:

- Experience greater personal satisfaction, a greater sense of achievement, and more genuine enjoyment in teaching.
- Deal more individually with misbehavior problems and diagnose causes before major problems occur.
- Develop more innovative, diverse, creative teaching practices.
- Take greater initiative to increase student motivation by recognizing differences in attitudes, human values, emotional maturity, personal sensitivity, unique skills, interests, goals, learning styles, personal background, and rates and degrees of cognitive development.
- Provide more individualized instruction.
- Effect better classroom management and discipline.
- Experience reduced teacher stress and tension, fewer learning and behavior problems, less paper work, and a more thorough knowledge of individual children.
- Experience a greater quantity and quality of interactions with students.

The atmosphere in the smaller class is generally characterized by:

- Greater freedom to test ideas with less anxiety and tension; to broaden perspectives; to interact more openly with others; to sharpen decision-making skills; and to explore, questions, discuss, or analyze concepts.
- A general emotional tone of greater warmth, courtesy, empathy, kindness, consideration, and respect among students and teachers.
- Less external coercion by the teacher to control student behavior and more spontaneous interaction with students.
- More diversified, creative activities, such as student-developed projects; individualized activities; discussions; role playing; real-life simulations; task-oriented small groups; forums and debates; listening activities; textbooks sup-

plemented by a greater variety of educational materials, media, and other concrete devices, including programmed materials, audio-visual aids, newspapers, crafts, tools, magazines, and books.

- Greater freedom for oral expression.
- Reduced levels of frustration, restlessness, tension, and personal conflicts among students.
- Lightened teacher workload.[4]

A 1963 NEA study revealed that the teacher of a large class of 35-40 students is unable to cope with individual student differences in that setting. These findings support Bereiter's viewpoint that the issue of class size may be more an issue of identity - large classes producing alienation and stress, smaller classes fostering personal development and identity and emotional well-being. And large classes can directly cause negative teacher feelings, frustration, depression, and serious nervous strain.[5]

In 1978 and 1979, in an analysis of 80 research studies, Smith and Glass revealed a substantial relationship between class size and achievement. Decreasing class size positively affects teacher workload, morale, and attitudes, and is thus passed on to students' self-concepts, attitudes toward school, and achievement. And the end result is a positive affective and social classroom climate.[6]

Effects of Small Classes in the Early Grades

Particularly in the earlier grades, studies have revealed that children need the extra attention available in smaller classes, because they are emotionally and intellectually dependent on the teacher and on concreate stimuli. In a study by Balow (1969), small class size in the first two years of reading instruction was revealed to have a greater impact on student achievement than during the later grades.[7]

And other studies support Balow in revealing positive effects of small class size on both classroom environment and pupil achievement in the primary grades. For example, Furno and Collins (1967) conducted a five-year study examining the relationship between class size and pupil achievement in third grade reading and math. Two thirds of the smallest classes showed greater gains on standardized achievement tests. And Cannon, in a 1955 study of a large and small kindergarten class, found the smaller class to be more relaxed and permissive with fully integrated group relationships; more positive teacher-child relationships; more varied and creative play; and an affectionate, relaxed, productive, spontaneous atmosphere. In contrast, the larger class was characterized by greater frustration and aggression and was less conducive to cooperation and creative play. And in the 1975-76 "South Carolina First Grade Pilot Project," the reading and overall achievement of first grade students in small classes was found to be significantly higher than those in larger classes.[8]

As children mature and become more independent, a small class is no longer as critical for the emotional and developmental needs as during the younger years. Nonetheless, some studies of secondary level classes have revealed that smaller classes positively influence student perceptions about their courses.[9]

Findings Which Support Large Classes

Results of a study by Johnson and Scriven (1967) suggest that "uncritical worship of small classes for all subjects, grades, and ability levels is unjustified."[10] Some research has indicated that a district's budget can be more effectively spent by slightly increasing class size while employing more counselors, providing special classes, and instituting after-school enrichment activities.

A 1970-71 study conducted in a junior high school in Brooklyn, New York to compare the effects of large and small group instruction in seventh grade math and language arts revealed that a large class with an excellent teacher produced more favorable learning outcomes than an average size class with an average teacher. In this study, individualized instruction or special grouping for instruction did not occur to a greater extent in the small class than in the larger one. If this case holds true in other studies, a school district might logically pay higher salaries to master teachers of large classes.[11]

Though it is an established fact that smaller classes offer increased opportunity for improving instructional practices, it is also an established fact that teachers do not automatically take advantage of these opportunities, often sticking to the same teaching methods they have used for years. In a study of grades four and five in eleven schools in Toronto, teachers felt that they made far more changes in their classroom management and supervision approaches, and physical layout than were observable from the outside. And in a study of second grade classes in Virginia and California, though teachers paid more individual attention to students, no teacher totally individualized the classroom.[12]

Most of the research findings which favor larger class size are based on higher grade levels. For example, Madden (1958), concluded that large classes of ninth grade math students scored higher than smaller classes. This and previously cited studies support the belief that as children mature and become more independent, they can more easily assimilate material on their own in a large class.[13]

Other Contributing Variables

Class size has not been borne out by research as the determining factor in improved instruction and pupil achievement, but as one of many variables which influence achievement. Other variables which interact with class size to influence the learning setting and its outcomes include:

- Student characteristics such as intelligence; achievement level; health; family stability, occupational, educational, and social background; emotional stability, motivation, self-concept, and over-all attitude.
- Teacher characteristics such as competency, personality, motivation, inclination to use appropriate and diverse methods of instruction, attitude toward class size, teaching experience.
- The instructional program, strategies, and purposes.

- Subject being taught and course content.
- Reasons for changing class size.
- Economic factors.
- Scheduling procedures.[14]

The activities in process in a classroom have been found to have significant impact on the learning environment, regardless of class size. For example, in a 1978 study by McCluskey, small group or individual work activities consistently had more positive impact than lecture; laboratory more than demonstration; student report more than movies. The conclusion from these findings seems to be that, regardless of class size, activities providing more student involvement are more effective in the classroom than more passive kinds of activities.[15]

Optimal class size is greatly dependent on the types of students involved and their special needs. There is some evidence that low achievers are more favorably affected by small class size than pupils with average ability or above, and that socio-economically deprived students benefit scholastically from smaller classes. Despite some research findings which contradict this evidence, it appears that the type of student involved is, nonetheless, of extreme relevance to the most appropriate class size.

Increasing teacher competency to adapt instructional approaches to varying class size is another significant influence on the effect of class size, whether small or large. The teacher who has had special in-service training to maximize instructional possibilities in large or small classes will be more apt to achieve optimal results whatever the class size. A measure of staff adequacy is often a better predictor of school quality than average class size.[16]

Deficiencies in the Research on Class Size

The research itself has become a major difficulty in resolving the issue of class size. The inconclusive nature of class size research is the result of several factors: (1) lack of clear definition as to what exact size constitutes a large and a small class; (2) inconsistent measures; and (3) failure to control important variables, especially the teacher variable, a difficult one to control. Thus, it appears that research is not so much inconclusive as it is not comprehensive.

Drawing conclusions, generalizing, or comparing results of these studies should be done cautiously due to these cited deficiencies in much of the research. Often the student's mastery of factual materials is the only aspect measured, to the neglect of measuring the development of important creative and social skills. Examples of the many intervening variables frequently not controlled include course content; teacher attitude; instructional strategies; individual learning differences; and amount and kinds of supportive services such as resource centers, teacher aides or tutors, and special materials.[17]

Many such studies use only one measure, often a norm-referenced test. And often the period of study is too short. Some class size studies run for a period of only a few

months; in these cases both children and teacher need more time to adapt to new procedures made possible by the smaller class size.[18]

Purported findings of the 1978 Glass-Smith meta-analysis of previous class size reviews stated that, without doubt, reducing class size results in increased student achievement. However, the 1980 Educational Research Service critique of their study revealed shortcomings, e.g., their findings rested largely on a very small percentage of the 76 studies purportedly reviewed, and overlooked many important aspects of the research.[19]

Reported findings of Flinker's 1972 study of large and small seventh grade classes claimed that large class students made greater achievement gains than small class students. However, he reported confounding of his results from two major intervening variables in the large class: (1) the teacher was the department chairman, and (2) a teacher aide assisted with instruction. Thus, admittedly, the experimental design was weak.[20]

The numerous weaknesses cited in experimental design of research studies on class size lead any reviewer to address the need to carefully examine the entire process, not strictly the findings alone.

Rationale for Increasing, Decreasing, or Maintaining Class Size

What criteria should be measured in analyzing the impact of class size? What are the desired end results for decreasing class size?... Increased school achievement? Improved student self-concept? Enriched human interaction in the classroom?

Economics and enrollment come into play in district decisions concerning class size. Advocates of larger class size have evaluated declining enrollment and seized upon the opportunity to cut costs by reducing the number of teachers. Others favor large classes due to budget constraints, holding that increasing class size slightly will not greatly increase workload or impair teaching practices or student achievement. Whereas, decreasing class size necessitates not only additional teaching staff, but additional administrative and other supportive staff, equipment, materials. and in-service training as well. To the contrary, proponents of small class size use declining enrollment as a means to decrease the number of students assigned to one teacher. And both sides are well supplied with research to support their stances.[21]

The issue, however, is more than one of class size per se or class size as it relates to budget; it is a more specific issue of class size for what and for whom? No single optimum class size applies to all situations, and a flexible approach is usally more suitable than a rigid class size policy - a flexible approach to allow varying class size for varying instructional purposes and student needs. It is clear that the optimal class size for an elementary special education class will not be the same as for a lecture class in high school honors physics. A band class may need 65 students for concert performance; a remedial reading resources class may require only five.[22]

The philosophy "smaller is not necessarily better" is reflected in the studies which hold that the range of student characteristics should be considered in order to most effectively determine class size. For example, students needing more special and individual attention (slow learners, hyperactive students, bilingual children, handicapped) are more appropriately placed in small classes. Yet, it is possible that with particular subjects and particular students, larger class size may provide an appropriate

learning environment. Appropriate class size relates to staffing arrangement and classroom organization, teacher workload, teacher style, grade level, subject, student ability, and homogeneity. According to Holland and Galfo, students need opportunities to learn in both large and small groups, with group size determined by teaching objectives.[23]

Alternatives to decreasing class size include team teaching, use of paraprofessionals, nongrading, multi-age grouping, and differential staffing. An alternative to reducing class size throughout a school is to only reduce class size for certain classes, possibly for only part of the day (e.g., a small class half a day for slow readers) and to use paraprofessionals in those classes which are standard size or larger. A teacher and a paraprofessional for every class of 30 could achieve a significant effect in reading and math achievement in the primary grades. In a nongraded setting, by grouping students according to ability, achievement, or interest, instead of by grade level, two or three teachers can often handle what would normally be considered as four, five, or six grade levels. (For example, two teachers might teach 45 students between five and nine years old).[24]

In attempting to realize the greatest effects of altering class size, districts need to help teachers learn to adapt instructional approaches to varying class sizes, and to set clear objectives to be reached by modifying class size. A plan is needed to support and educate personnel to realize the potential which exists in instructional techniques for various class sizes.[25]

Conclusion

Any decision concerning class size should be reached only after careful examination of numerous contributing variables. Intervening factors to be considered include student and teacher characteristics; instructional program, purpose, and goals; availability of paraprofessional and other support staff, services, and materials; and budgetary considerations. In addition, results of research studies on class size do not stand alone as conclusive evidence; the entire research process for each study must be reviewed due to inadequacies in the research design in many cases.

And, in determining the optimal class size for a given setting or purpose, the desired end results should be carefully plotted while reviewing all intervening factors. End results could include increased student achievement, heightened teacher professionalism, morale, and fulfillment; improved student self-concept; or enriched, warmer classroom environment. Or the desired end result might be strictly to cut budget. Whatever the rationale or long-range goal, many factors must be considered, and no single optimal class size is going to be the answer for all classes, teachers, students, or schools.

Footnotes

[1]"Class Size," *NEA Briefing Memo,* No. 10 (April 1976).

[2]"The Question of Class Size," *Info-Item Educators Digest, No. 2040,* pp. 5-6.

[3]Filby, Cahen, McCutcheon, and Kyle, "What Happens in Smaller Classes?" (January 1980), p. 9; Lawrence E. Bozzomo, "Does Class Size Matter?" *National Elementary Principal;* Vol. 52, No. 2 (January 1978).

[4]Bozzomo, *op. cit.;* Filby, Cahen, McCutcheon, and Kyle, *op. cit.,* p. 9; "The Question of Class Size," *Info-Item Educators Digest, No. 2040, op. cit.,* pp. 13-17; Irving Flinker, "Optimum Class Size: What Is the Magic Number?" *The Clearing House* (April 1972), pp. 471-73; Joseph E. Millard, "Small Classes? What Research Says About Effective Class Sizes and Possible Alternatives to Small Classes" (January 1977); Sydney Thompson, "Class Size," *ACSA School Management Digest,* Series 1, No. 12. ERIC/CEM Research Analysis Series, No. 39 (1978), p. 33.

[5]Dee Schofield, " Class Size," *School Leadership Digest* (August 23, 1974), p. 8; Thompson, *op. cit.,* p. 28; The Question of Class Size," *Info-Item Educators Digest, No. 2040, op. cit.,* p. 16.

[6]Mary Lee Smith and Gene V. Glass, "The Effect of Class Size on What Happens in Classrooms," *The Education Digest* (March 1980), pp. 16-17.

[7]Thompson, *op. cit.,* p. 28; William F. Murphy, *Class Size and Teacher Load* (April 1975), p. 22.

[8]Millard, *op. cit.;* Thompson, *op. cit.,* pp. 18-19; *South Carolina First Grade Pilot Project 1976-77: The Effects of Class Size on Reading and Mathematics Achievement,* pp. 3-5.

[9]*Class Size: A Summary of Research,* p. 69.

[10]Murphy, *op. cit.,* pp. 16, 26.

[11]Flinker, *op. cit.*

[12]Stan M. Shapson and others, *Results of an Experimental Study of the Effects of Class Size,* pp. 30-31; Filby, Cahen, McCutcheon, and Kyle, *op. cit.,* p. 16.

[13]Schofield, *op. cit.,* p. 11; Thompson, *op. cit.,* p. 28.

[14]Bozzomo, *op. cit.;* J.K. Lindsey, "A Re-Analysis of Class Size and Achievement as Interacting with Four Other Critical Variables in the IEA Mathematics Study," *Comparative Education Review* (June 1974), pp. 314-26; Millard, *op. cit.,* pp. 4-8; Ian Templeton, "Class Size," *Educational Management Review Series,* No. 8 (August 1972), pp. 4-5.

[15]Lawrence McCluskey, "Class Size or Mode of Instruction: What Makes the Difference in Classroom Process" (June 1978), p. 12.

[16]Millard, *op. cit.*

[17]Schofield, *op. cit.*, pp. 3-6; Murphy, *op. cit.*, p. 35; Millard, *op. cit.*, p. 8; "The Question of Class Size," *Info-Item Educators Digest, No. 2040,* p. 17.

[18]Filby, Cahen, McCutcheon, and Kyle, *op. cit.*, p. 16.

[19]"Class Size Research: A Critique of Recent Meta Analysis," *Educational Research Service, Inc. Special Report,* pp. 62-63.

[20]Schofield, *op. cit.*, pp. 11-12.

[21]"Class Size," *op. cit.;* McCluskey, *op. cit.*, p. 4; Thompson, *op. cit.*, pp. 34-36; Schofield, *op. cit.*, p. 17.

[22]"Class Size," *op. cit;* Millard, *op. cit.;* McCluskey, *op. cit.*, p. 2.

[23]Leonard S. Cahen and Nikolai N. Filby, "The Class Size/Achievement Issue: New Evidence and a Research Plan," *Phi Delta Kappan,* Vol. 60, No. 7 (March 1979), 495; Murphy, *op. cit.*, p. 26; Thompson, *op. cit.*, p. 30.

[24]Millard, *op. cit.*, p. 9; Cahen and Filby, *op. cit.*, p. 495.

[25]Shapson and others, *op. cit.*, p. 31.

Bibliography

Bozzomo, Lawrence E. "Does Class Size Matter?" *National Elementary Principal,* Vol. 52, No. 2 (January 1978), 78-81.

Cahen, Leonard S., and Nikolai N. Filby. "The Class Size/Achievement Issue: New Evidence and a Research Plan." *Phi Delta Kappan,* Vol. 60, No. 7 (March 1979), 492-95, 538. (ED 197 901)

"Class Size." *NEA Briefing Memo,* No. 10 (April 1976).

Class Size: A Summary of Research. Educational Research Service, Inc., 1978.

"Class Size Research: A Critique of Recent Meta Analyses." *Educational Research Service, Inc. Special Report.*

Filby, Cahen, McCutcheon, and Kyle. "What Happens in Smaller Classes?" Far West Laboratory for Educational Research and Development, January 1980.

Flinker, Irving. "Optimum Class Size: What Is the Magic Number?" *The Clearing House* (April 1972), pp. 47[illegible]

Lindsey, J.K. "A Re-Analysis of [illegible] Achievement as Interacting with Four Other Critical Variables in the [illegible]thematics Study." *Comparative Education Review* (June 1974), pp. 314-2[illegible]

McCluskey, Lawrence. "Class Size or Mode of Instruction: What Makes the Difference in Classroom Process?" (June 1978). (ED 158 409)

Millard, Joseph E. "Small Classes? What Research Says About Effective Class Sizes and Possible Alternatives to Small Classes." Ankeny, Iowa: Hartland Education Agency, January 1977. (ED 133 897)

Murphy, William F. *Class Size and Teacher Load.* Newton, Massachusetts: New England School Development Council, April 1975. (ED 107 627)

Schofield, Dee. "Class Size." *School Leadership Digest* (August 1974), pp. 1-26.

Shapson, Stan M., and others. *Results of an Experimental Study of the Effects of Class Size.* Toronto: Ontario Department of Education, March 1978. (ED 151 985)

Smith, Mary Lee, and Gene V. Glass. "The Effect of Class Size on What Happens in Classrooms." *The Education Digest* (March 1980), pp. 16-18.

South Carolina First Grade Pilot Project 1976-77: The Effects of Class Size on Reading and Mathematics Achievement. South Carolina Department of Education, Office of Research Report Series, Vol. 1, No. 35.

Templeton, Ian. "Class Size." *Educational Management Review Series,* No. 8 (August 1972).

"The Question of Class Size." *Info-Item Educators Digest, No. 2040.* Washington, D.C.: National Education Association. (ED 133 325)

Thompson, Sydney. "Class Size." *ACSA School Management Digest,* Series 1, No. 12. ERIC/CEM Research Analysis Series, No. 39 (1978). (ED 154 471)

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